APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,979	12/31/2001	Debargha Mukherjee	10006292-1	5324

		EXAMINER
7590	09/09/2004	LAROSE, COLIN M

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ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/036,979	MUKHERJEE ET AL.
	Examiner	Art Unit	
	Colin M. LaRose	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *14-19* is/are allowed.

6)☒ Claim(s) *1-3,5,6,8-10 and 13* is/are rejected.

7)☒ Claim(s) *4,7,11 and 12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1.   A request for continued examination under 37 CFR 1.114, including the fee set forth in

37 CFR 1.17(e), was filed in this application after final rejection. Since this application is

eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e)

has been timely paid, the finality of the previous Office action has been withdrawn pursuant to

37 CFR 1.114. Applicant's submission filed on 21 June 2004 has been entered.

Response to Amendments and Arguments

2.   Applicant has amended claim 1 to denote that the plurality of stripes "span the image."

Applicant then argues (see Remarks filed 21 June 2004) that both Bottou and the combination of

Bottou and de Queiroz '981 do not disclose or suggest such a feature. Applicant points to the fact

that Bottou and de Queiroz '981 employ "blocks" as evidence that the two do not teach "a

plurality of stripes spanning the image." (Figure 4 of Bottou and figure 2 of de Queiroz '981

illustrate the use of blocks.)

A "stripe" is broadly defined as a band that is longer than it is wide. It is clear that

Bottou's rectangular blocks would qualify as "stripes" since a rectangle fits the broad definition

of a "stripe."

The present issue is whether Bottou's plurality of stripes "span the image." It is clear

from figure 4 of Bottou that the plurality of stripes (or rectangular blocks) does indeed span the

entire image. In figure 4 of Bottou, the "stripes" are placed in a 6x9 arrangement such that they

cover the entire image, and therefore, it can be said that the stripes "span the image." Also,

Bottou's stripes can be said to span the image in both the horizontal and vertical directions, since the entire image is covered by stripes.

Thus, Examiner contends that Bottou discloses the feature of the "plurality of stripes spanning the image."

Examiner also notes column 1, lines 63-67, in de Queiroz '981, wherein de Queiroz '981 discloses that for the purposes of MRC processing, the image is segmented into a plurality of stripes, which are composed of blocks. The height of each stripe is equal to one block, and each stripe (presumably) spans the image lengthwise. This teaching appears to coincide with Applicant's segmentation of the image into stripes, as depicted in figure 2 of the instant application. However, Examiner maintains that Bottou anticipates the "spanning stripe" feature, and de Queiroz '981 is not relied upon for this feature.

3.   Applicant also argues (see page 12 of Remarks filed 21 June 2004) that Bottou does not teach or suggest "determining a layer base color, a layer size, and a layer offset of a stripe," since Bottou determines these features on a pixel-wise basis, rather than for each stripe.

Examiner contends that the determining of the aforementioned features for each pixel embraces the determining of the features for each stripe – once the features of all pixels are determined, then the features of the larger stripe areas are also known. In addition, once the features of the stripes are known, then the features of the entire image are known.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

5.   The text of those sections of Title 35, U.S. Code not included in this action can be found

in a prior Office action.

6.   Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent

5,900,953 by Bottou et al. ("Bottou") in view of de Queiroz '981.

[de Queiroz '981 incorporates by reference U.S. Patent 6,334,001 by de Queiroz et al.

("de Queiroz '001"). See column 3, lines 45-50 and column 4, lines 7-8.]

Regarding claim 1, Bottou discloses a method of decomposing an image comprising:

decomposing the image into a plurality of stripes (column 4, lines 3-6: image is divided

into rectangular stripes, or blocks, that provide coverage of the entire image);

determining a layer base color, a layer size, and a layer offset of at least one stripe of the

plurality of stripes (figure 2 and column 3, lines 25-34: A pixel of interest is determined to reside

in either the foreground layer or the background layer based on the difference (offset) between

the current color of each of the layers and the color of the pixel of interest. This difference

corresponds to the "layer offset". The foreground and background layer base colors are

determined as an average of all the pixels in each layer. And after all pixels in all the stripes are

assigned to either the foreground layer of background layer, then the size of each layer is

known); and

separating said at least one stripe into a foreground layer and a background layer based

on the layer base color and the layer offset (column 3, lines 25-34: as explained above, the pixels

of each stripe in the image are separated into the foreground and background layers based on

both the color of the layers ("layer base colors") and the offset between the pixel of interest and

the layer base colors ("layer offset")).

Bottou is silent to creating a mask layer and interpolating irrelevant values, as claimed.

de Queiroz '981 discloses a system for segmenting images into foreground and

background planes in the Mixed Raster Content environment, similar to that of Bottou. In

particular, de Quieroz discloses segmenting a document into 3 layers – background, foreground,

and selector (column 5, lines 32-49).

It would have been obvious to one of ordinary skill in the art at the time of the invention

to modify Bottou by de Queiroz '981 to further separate the image into a mask layer, as claimed,

since de Queiroz '981 discloses that, for the MRC format, images are conventionally segmented

into foreground and background layers, and a mask layer is also created in order to indicate to

which layer each pixel belongs (see column 1, lines 25-32).

de Queiroz '001 discloses that a way to enhance compression of MRC-decomposed

documents is to interpolate irrelevant pixels in the background and foreground layers (de

Queiroz '001, column 9, lines 41-55: irrelevant pixels (N's) are interpolated (i.e. replaced)).

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify Bottou by de Queiroz '981 to interpolate, as claimed, since de Queiroz '001 discloses that interpolating irrelevant pixel values in the foreground and background layers enhances compression (i.e. interpolating increases coder efficiency).

Regarding claim 2, Bottou discloses encoding each of the layers (column 1, lines 36-38).

Regarding claim 3, de Queiroz '981 discloses the foreground and background are JPEG encoded, wherein the mask is JBIG encoded (column 5, line 57 through column 6, line 3).

7.   Claims 5, 6, 8-10, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bottou in view of de Queiroz '981, and further in view of "On Data Filling algorithms for MRC Layers" by de Queiroz ("Data Filling").

Regarding claim 5, de Queiroz '001 discloses the interpolating further comprises:

classifying each pixel within a selected block of a selected layer as relevant or irrelevant (figure 4: Y = relevant pixels, N = irrelevant pixels);

generating a coefficient block representing a forward transform of the selected block (804, figure 9);

modifying coefficient values to generate a modified coefficient block (804: quantize coefficients and 806: remove some coefficients) subject to a set of predetermined constraints (812: the condition(s) to stop modifying the coefficients).

de Queiroz '001 discloses that the pre-determined constraints include comparing the relevant pixels in consecutive blocks and discontinuing the iterations if "a designated criteria is met" or "a designated amount of improvement or change has occurred" (column 10, lines 34-44).

Thus, de Queiroz '001 does not expressly disclose the constraint is that the "relevant pixels have a same value in an inverse transformation of the modified block as in the selected block.

"Data Filling" is a paper by de Queiroz that discloses the same iterative modification of DCT coefficients for each block. In particular, "Data Filling" discloses that the constraint for modifying the DCT coefficients is "convergence", wherein convergence is achieved when successive relevant pixels are identical (see Section 4.2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify de Queiroz '001 so that the constraint for modifying the coefficients is that the relevant pixel have a same value as claimed, since "Data Filling" teaches that using the claimed stopping criteria achieves superior results.

Regarding claim 6, de Queiroz '001 discloses the modifying includes:

selecting a coefficient from the coefficient block in a reverse zig-zag order wherein the selected coefficient has a non-zero value (806, figure 9: high frequency coefficients are selected (and removed), according to the zig-zag order shown in figure 10); and

finding a feasible solution resulting in a zero quantizable selected coefficient subject to the predetermined constraints (812, figure 9: a feasible solution is reached when the stopping criteria is met (i.e. convergence is achieved, per "Data Filling"); and the solution contains coefficients quantized to zero (i.e. removed)).

Regarding claim 8, de Queiroz '001 discloses values of individual elements of a mask classify pixels in corresponding positions within the selected block as relevant or irrelevant (figure 3: pixels values in mask (selector plane) determine the relevance of pixels in the upper and lower planes, as shown in figure 4).

Regarding claim 9, de Queiroz '001 discloses:

providing the modified coefficient block to a block compression process (figure 9: modified coefficient block from 804 is sent to a block compression stage (806) to remove high frequency coefficients).

Regarding claim 10, de Queiroz '001 discloses the interpolating further comprises applying a linear program to identify a feasible solution resulting in a zero-quantizable coefficient subject to the constraints (812, figure 9: a linear inequality function ("program") is applied to determine if the current pixels are sufficiently close to the original pixels).

Regarding claim 13, de Queiroz '001 discloses that the forward transform is discrete cosine (804, figure 9).

Allowable Subject Matter

8.   Claims 4, 7, 11, and 12, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 14-19 are allowed. Neither Bottou nor de Queiroz '981 discloses or suggests the step of identifying the claimed area of intersection by computing a maximum block range, as

claimed, and by assigning at least one pixel within the selected block to one of the foreground

and background planes, as claimed.

Conclusion

9.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489.

The examiner can normally be reached Monday through Thursday from 8:00 to 5:30. The

examiner can also be reached on alternate Fridays.

       If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the

organization where this application or proceeding is assigned is (703) 872-9306.

       Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the TC 2600 Customer Service Office whose telephone number is (703)

306-0377.

CML
Group Art Unit 2623
2 September 2004

VIKKRAM BALI
PRIMARY EXAMINER